Pit and Quarry

SAND · GRAVEL · STONE

HANDLING · CRUSHING · SCREENING · WASHING

A Yard a Minute—

will keep the wagons moving. That rate of speed is easily averaged with the

BURCH CAR UNLOADER

Some users exceed that pace. Fast loading is necessary, but low operating cost of the machine is essential. The simple, practical design of the "Burch" eliminates the need of several shovelers. It is sturdy and compact, capable of withstanding the most severe use.
You ought to also know about our stone spreader used in connection with motor truck in spreading stone or gravel on road.

Write for Complete Details

The Burch Plow Works Company Crestline, Ohio

JUNE, 1918

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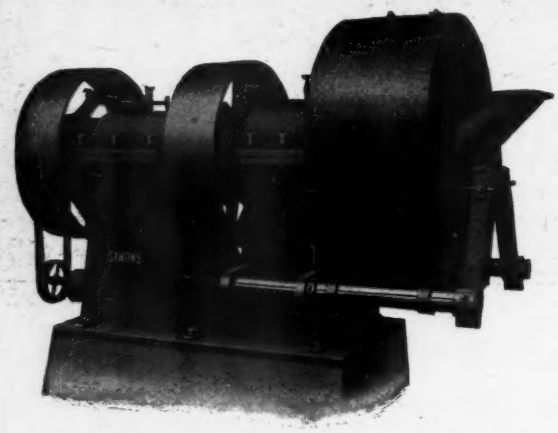
SYMONS DISC CRUSHER



READY FOR IMMEDIATE DELIVERY

Questionnaire Sent to All Users, and One of the Answers

Q. Size crusher this report covers? Ans. *48 inch.*
Q. Kind of material crushed? Ans. *Limestone.*
Q. What moisture in material? Ans. *No Record.*
Q. How long have you operated crusher? Ans. *3 years.*
Q. What is size of feed? Ans. *4 inches.*
Q. What is size of product? Ans. *1½ inch.*
Q. What horsepower does it require? Ans. *65.*
Q. How many tons per hour does it crush? Ans. *80 to 100.*
Q. How many tons do you crush per pair of discs? Ans. *750,000 tons.*
Q. What percentage of time have you lost on account of breakage? Ans. *None.*
Q. Give your opinion of this crusher as compared to rolls. Ans. *Would not use rolls.*
Q. Give your opinion of this crusher as compared to a jaw crusher. Ans. *Superior to Jaw crusher.*
Q. Give your opinion of this crusher as compared to a Gyratory crusher. Ans. *Superior to Gyratory crusher.*

Signed *Name on Request.*

Many more like this, also reports of the success of the crusher on different kinds of material.

Also built in sizes 18 in., 24 in. and 36 in.

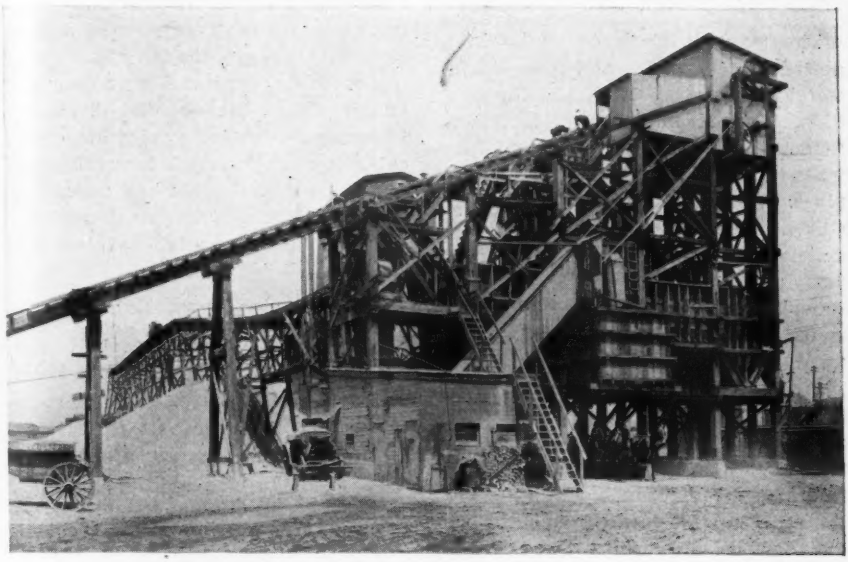
Manufactured and Sold Only by

Chalmers & Williams

CHICAGO HEIGHTS, ILL.

Pit and Quarry

Vol. 2 Chicago, Ill., June, 1918 No. 7



PLANT OF THE WARE SAND AND GRAVEL CO., CINCINNATI, OHIO. INCLINE LEADS FROM THE RIVER. NOTE THE TRESTLE OVER THE STORAGE YARD. RAILROAD CARS ARE LOADED AT THE EXTREME RIGHT

River Plant Operates Almost the Year Round

Storage Piles with Tunnel Furnish Material to Loading Bins Except in Coldest Weather.

FORTUNATE, indeed, is the sand and gravel plant that can continue operations and find a ready market for its product in these days of car shortage and dull building conditions. The Ware Sand & Gravel Co., Cincinnati, Ohio, is so situated. It takes a decided freeze-up to stop them. There are several contributing factors for this condition—but let's get on with the story.

In the first place, it is helping Uncle Sam by cleaning out sand bars in the Ohio river. Different sand bars have different grades of material in them, so the company attacks the bar that contains the mixture of sand and gravel desired. A very interesting

sucker boat, designed by Menter Ware and built, for the most part, by Littleford Bros., of Cincinnati, draws up the material from under the water through two pipes at one end of the boat by two 10-inch Morris centrifugal pumps.

Pumping Plant

The man at the lever works in a glass-inclosed room and can easily watch the sucking pipes and the flow of water and material as it leaves them. He can tell by the mixture when there is danger of choking the pipes. A choked pipe sometimes requires a week to clean out. Each pipe delivers to a hopper in the top of the boat, and these hoppers in turn feed to cylindrical screens 4 feet in diameter and 34 feet long which tilt downward toward the middle of the boat. The first 20-foot ring in each screen takes out the sand, which falls into an inverted pyramid-shaped settling reservoir; then there are 9 feet of perforations for the 2-inch material, and the coarser stuff goes through the remainder and downward through the boat to the river bottom.

How Excess Water Is Run Off

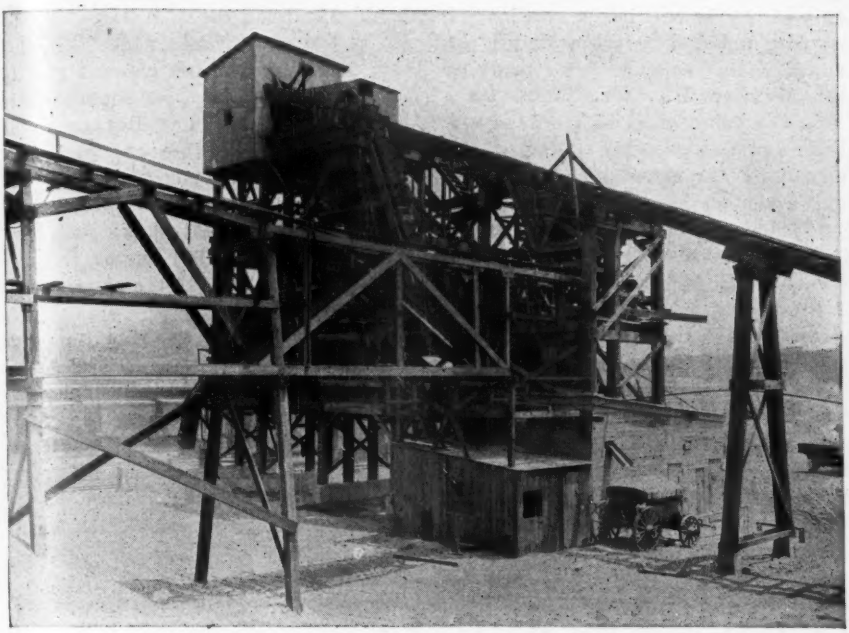
The design of the reservoir under the screens permits excess water to be run off to such an extent that the sand when chuted to the barges is dry enough to be rounded up on top to 6 inches higher in the middle than at the sides of the barge. There is one chute on each side of the boat leading from the reservoir to the barges—for loading sand on one side of the boat and gravel on the other. An up-and-down-sliding door in each shute checks the flow of water, for the sand, being heavier, passes through while the water is held back.

Some time ago a crusher was installed to break up the refuse and run it back through the screens but it proved to be too expensive because of the small amount of too-big gravel. The boat is 135 feet long, 35 feet wide and 6 feet deep. It has three McIlvain & Spiegel (Cincinnati, O.) boilers and was built 17 years ago at a cost of $23,000, after the Ware brothers had visited many hydraulic sand boats and selected what in their opinion were the best features of design. Several changes have since been made. It is operated by six men and pumps where the channel is lowest, in order to assist navigation. The cabin is roomy enough for eating and sleeping on the boat, when necessary. A Frizbie (Frizbie Engine & Machine Co., Cincinnati) engine revolves the screens.

Barges and Their Unloading

There are five barges, each 100 feet long, 22 feet wide, with 5-foot holes, and 3-foot cargo boxes on top. These are pushed to the plant four to six at a time (the company sometimes finds it necessary to hire additional barges) by the concern's own steamboat, the "J. R. Ware," a craft 115 feet long, 26 feet wide and 4 feet deep, having a scow bow, a 12-inch engine (Iowa Machine Works, Clinton, Iowa) with a 5-foot stroke, three boilers and its own electric lighting system. When not in use it engages in regular river traffic. Sometimes entire barge loads are sold to other plants.

At the plant the barges are unloaded into a drop-bottom car traveling up an incline to the plant. Unloading is done by a Hayward clamshell 1½-yard bucket swung from a 50-foot boom. The drop-bottom car holds 2 yards, is much smaller at the bottom then at the top, and is drawn up the incline by an Allis-Chalmers gas friction hoist. The incline is 360 feet long and has only a single track, but a round trip can be made every two minutes, which is fast enough to keep the plant supplied. The car has four



Opposite view of preceding picture. Note start of trestle over storage yard, and elevator which takes material to bins from conveyor belt in tunnel, leading from storage yard.

wheels of extra hard steel and is itself built of steel.

Two Dumping Places for Plant and Storage Yard

There are two dumping places—one where the incline first touches the plant, and the other a few feet further up. An ingenius tripping device opens the door at whichever point it is desired to dump, and also closes the door on the downward trip. Lack of space prohibits a complete and understandable description of these trippers. The first dumping place consists of a hopper which delivers to a lateral conveyor belt 330 feet long between centers which is supported on a trestle so that a huge storage yard can be formed underneath it and west of the plant. This belt is 20 inches wide and travels on Webster rollers. The other dumping point supplies the various bins in the plant with material by chutes. Under this hopper there are two flat, inclined screens which take out paving pebbles and grit, which go to small bins by chutes. Building, foundry and engine sand and concrete gravel are produced.

Tunnel Under Storage Yard

The storage yard under the trestle holds 25,000 tons, one-third gravel and two-thirds sand, and it is generally kept well filled. Material is taken from the storage piles to the plant bins for loading out by a belt conveyor running in a tunnel 8 feet wide and 10 feet high. Holes in the top of the tunnel, and consequently at the bottom of the storage piles, let the material down to the conveyor belt. These holes are 10 by 10 inches and have sheet iron spouts hanging under them. At present the belt has been taken off the trestle and is now working in the tunnel, although in the past two belts have been used.

Under the plant the material is

thrown off the belt into a small wooden box, and thence into a slightly inclined chain bucket elevator made by the Webster Mfg. Co., Tiffin, Ohio. This box takes the shock off the elevator and also prevents spilling of the material. The elevator is 75 feet between centers and carries steel buckets 18 inches wide which dump into a three-way chute. By the use of levers material can be sent to any bin desired. An independent gas engine (Bessemer Gas Engine Co., Cincinnati) operates the elevator.

The plant has six bins — two for sand, two for gravel, and one each for paving pebbles and grit from the screens, previously mentioned. It is elevated so as to provide four loading places underneath for teams and trucks, and has spouts at the end for loading railroad cars. It has a capacity of 700 cubic yards a day. While this is not an unusual amount, yet it is sufficient to keep all departments working steadily. The storage piles and city trade enable the plant to keep going continuously except in zero weather. Seven teams are owned by the company but these probably will be supplanted by motor trucks. Cincinnati's hills make the choosing of motor trucks a matter wherein careful consideration must be given to the manner in which they will be used.

Twenty to forty men are employed. Railroad shipments are over the B. & O. The plant has been operating five years. Raymond Ware is manager and Mentor Ware, his brother, is in charge of the river end of the business.

Bookkeeping

What the Books Should Show

By EDWIN L. SEABROOK

Bookkeeping is the confidential advisor of the business man about his business affairs. It should give him complete and detailed information on every subject in which he is vitally interested. The real object of bookkeeping is to measure and show the operating results and current status of the business. It should show something more than how much is owing the business or owed by it.

BRIEFLY, bookkeeping consists in recording the history of each business transacted concisely, to show the date and terms of the transaction, *and the results of the transaction*, as they relate to the business for which they are kept.

The books of those engaged in the sand, gravel or crushed stone business and kindred lines should show:

The amounts due from others.

The amounts owing by each and the nature of these.

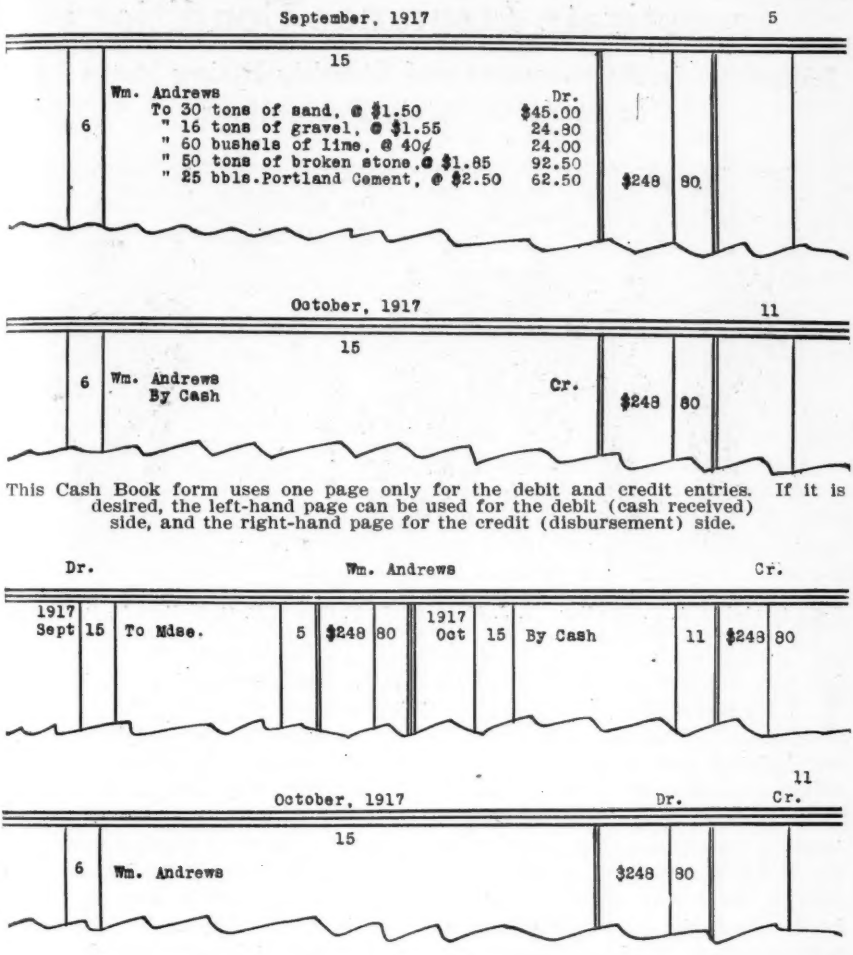
Cash received, from whom, from what source and for what purpose.

Cash disbursed, or paid out; to whom and for what purpose.

The amount paid for material or merchandise.

The amount paid for labor.

The amount paid for salary of the



This Cash Book form uses one page only for the debit and credit entries. If it is desired, the left-hand page can be used for the debit (cash received) side, and the right-hand page for the credit (disbursement) side.

proprietor, or what he draws from the business.

The amount paid for rent; office help; telephone; insurance; printing; postage; taxes; carfares; freight, hauling; including upkeep of hauling and equipment; interest and discount, whether given or taken; uncollectible accounts; every item and amount of same that is spent for the cost of conducting business or overhead.

Depreciation of machinery, tools, etc.

The total amount of business, which will be orders received, or merchandise sold, during the year.

The inventory which shows the amount of material and value of working equipment on hand.

Finally, condensing these accounts into one, which will show the total transactions for the year; what it cost for the merchandise, labor, expense, etc., to produce the business of the year. The difference between the total amount of business and what it

(Continued on page 241)

Investigate Insurance Conditions

Difference in Assessments and Steadily Rising Rates Lead to Study of Safety Precautions.

Left to right—A. P. Sandles, W. J. Keevers, P. F. Casey, F. G. Pulley, T. P. Kearns, Victor T. Noonan, N. C. Rockwood, R. H. Pausch and D. C. Souders.

UNDER THE LAW IN OHIO all employers in the state are prohibited from taking out employers' liability and workmen's compensation insurance in stock companies, hence the quarry operators are obliged to either accept the plan provided by the State Industrial Commission or furnish their own insurance under bond. Probably all use the former method. Rates are based on a merit scale, depending upon the amount of safety precautions incorporated into the plants. With the exception of The France Stone Co. and the Ohio Marble Co. probably none has received the minimum rate of $3.85, some plants paying as high as $4.77 per $100 of payroll.

Ohio Macadam Association Appoints Committee

Even the $3.85 minimum has been advanced from $2.30 since January 1, 1916. The companies paying the higher rates feel that the insurance cost is excessive, while those using a greater number of safety appliances believe that they have to carry some of the hazard of the former. To adjust the matter, a committee consisting of D. C. Souders, of the France Company, and Robert H. Pausch, of the Marble Cliff Company at Columbus, was appointed by the Ohio Macadam Association to work with another member appointed by the State Industrial Commission. Mr. Souders has given practically all of his time to the insurance question in all phases for all of the France concern's plants during the past two years.

Joins with State Industrial Commission

Sessions were held April 25 and May 2 in the office of E. E. Watson, actuary of the State Industrial Com-

mission, in Columbus, and another meeting May 13 at which Mr. Watson appointed P. F. Casey, rating actuary of the commission, to give full cooperation as the Commission's member of the committee. The intention is to visit a number of plants, investigate conditions and eventually draw up a set of recommendations to submit to the State Industrial Commission, which has the power to make the same a law if a general advisory committee of fifteen considers the suggestions reasonable and practical. However, the details of future action are not yet worked out. It is quite likely that the proposed code will first be submitted to all of the quarrymen of the state to receive their approval of it, and then deliver it to the State Commission for consideration and final passage as a law with the stone industry's support. In fact, this voluntary method was favored by all present.

Plant Inspection Begun

On Tuesday, May 14, the committee, accompanied by Victor T. Noonan, safety director of the Commission; T. P. Kearns, inspector of workshops and factories; A. P. Sandles, secretary of the Ohio Macadam Association, were conducted through the Marble Cliff plant near Columbus by W. J. Keevers, in charge of the crushed stone department of that firm. A number of other plants will be visited, where it is thought that sufficient pointers, such as the wearing of goggles over emery wheels, keeping railroad yards clear, guarding belts, placing railings on steps and other places where needed, etc., will be suggested to make up a code that is practically complete. It is realized that a feature of first importance is the education of the men to protect themselves and to report cases where improvements should be made. Plant outputs cannot be lowered nor changes made at excessive cost; but when one considers that the workmen's compensation insurance cost in some plants over that in similar institutions amounts to as high as $5,000 a year, the importance of the work of this committee is obvious. Undoubtedly it will result in the saving of many thousands of dollars to the quarrymen.

Safe Practices in Quarry and Plant

BY WILLIAM H. BAKER

Assistant General Superintendent, Atlas Portland Cement Company

Address delivered at the National Safety Council

THE OPPORTUNITY for welfare work is extensive in the average quarry. Four years ago, at the Hannibal (Mo.) mills of the Atlas Portland Cement Company, we recognized the necessity of organizing our employes in such a way that they would be actively interested by representation in the safety and welfare work at the plant. About this time we organized our Committee on Safety and Welfare.

Personnel of Committee

The committee originally consisted of three permanent members and six rotating members. The regular members selected were men whom we wished to train thoroughly in safety work and to act as leaders in the general movement. The balance of the members are grouped in lots of two, serving six months each, and after six months two of the members are replaced by two others, so that each

Kind of quarry.	In and about quarry															In outside works.												Grand total.
	Falls or slides of rock or overburden	Handling rock at face	Timber or hand tools	Explosives.	Haulage	Falling into quarry from surface, benches, or face.	Falling from holsts, derricks, ladders, etc.	Drilling and channeling (by machine or hand)	Electricity.	Machinery.	Flying pieces of rock from sledging	Nails, splinters, etc.	Boiler and air-tank explosions	Animals.	Other causes.	Total.	Haulage.	Railway cars and locomotives.	Crushers.	Cranes, derricks, etc.	Other machinery	Falls of persons.	Hand tools	Electricity.	Nails, splinters, etc.	Flying pieces of rock or steel from sledging or crushing.	Flying or falling objects (rocks, timbers, etc.).	Burns.	Handling rock by hand.	Other causes.	Total.	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		16	17	18	19	20	21	22	23	24	25	26	27	28	29		
Killed																																
Cement rock	5			1	4										1	11	1	2	1		6	1		1			2	3		3	20	31
Granite	5		1		3	1	1	2								15	1	3			1	1								1	7	22
Limestone	14		2		16	8	2	1		4	5	1			5	58		5	3	2	6			2			3			3	24	82
Marble			1													1					1						2				4	5
Sandstone and bluestone	2					1	1									4				1	1										2	6
Slate	1	1			2	2	4									10											1				1	11
Trap-rock	6	1			3	3		1							1	15	1														1	16
Total	**33**	**6**	**1**	**28**	**15**	**8**	**4**		**4**	**6**	**1**				**8**	**114**	**3**	**10**	**4**	**4**	**15**	**2**		**3**			**8**	**3**		**7**	**59**	**173**
Injured:																																
Cement rock	221	384	104	63	195	30	20	65	1	189	74	17	3	28	234	1,628	73	77	36	15	190	137	220	26	49	74	196	106	34	383	1,616	3,244
Granite	62	171	27	50	24	22	26	85	1	55	175	42	2	1	180	923	13	15	15	27	23	34	60	1	15	311	49	19	135	60	777	1,700
Limestone	537	878	238	169	438	51	60	245	11	153	425	104	2	49	461	3,821	146	241	108	75	195	172	218	9	94	124	211	161	177	378	2,309	6,130
Marble	4	34	21	....	16	2	5	55	....	20	22	3	1	1	3	187	14	8	....	6	60	20	38	3	21	18	53	4	70	31	355	542
Sandstone and bluestone	51	36	18	14	19	10	1	17	....	17	30	6	....	3	75	297	9	10	4	18	21	12	28	....	6	41	17	7	59	69	301	598
Slate	34	54	16	16	9	7	5	13	....	21	11	1	....	....	64	251	2	1	....	2	16	2	9	....	1	3	8	1	35	26	106	357
Trap-rock	55	263	28	26	38	4	16	19	....	14	133	22	1	3	56	678	12	13	15	9	11	15	19	1	6	12	21	10	47	17	178	856
Total	**964**	**1,820**	**452**	**338**	**739**	**126**	**133**	**499**	**13**	**469**	**870**	**195**	**9**	**85**	**1,073**	**7,786**	**269**	**365**	**178**	**152**	**525**	**392**	**592**	**40**	**192**	**583**	**555**	**308**	**527**	**964**	**5,642**	**13,427**

QUARRY ACCIDENTS IN THE UNITED STATES.

Accidents at quarries during 1916, according to returns made to the Bureau of Mines, show an increase in the number of fatalities as well as the fatality rate per 1,000 men employed. The fatality rate is 2.26, as compared with 1.8 in 1915. The table above shows the fatalities and injuries in all quarries, by causes and kinds of quarry, during the year ending December 31, 1916.

year all departments on the plant are represented.

Naturally, departmental foremen were the first men selected, but, after operating the committee for four years, we now have the opportunity of training the general employes as well as their foremen. An alternate is appointed to serve in the absence of his regular representative and in the course of time it is usual, as vacancies occur, for the alternate to receive appointment as a regular member on the committee. As members of the committee we endeavor to select men who have in some way, by suggesting safety practices or otherwise, indicated to their foremen that they are interested in safety work.

Committee Work Made Attractive

We have created throughout the plant the desire on the part of all men to become members of the Safety and Welfare committee. This desire may in part be due to the fact that, upon being appointed to the committee, they are presented with a gold button symbolic of safety and welfare work. At the committee meetings are presented the various pamphlets which are issued by the Portland Cement Association and the National Safety Council, reports from the other plants of the Atlas Portland Cement Company, and a summary of the accidents at the local plant. The latter is carefully studied and the chairman of the committee appoints sub-committees to investigate and report upon certain accidents of an unusual nature.

Lectures on first-aid work are occasionally given, and the general plan is to keep the men thoroughly interested and enthused in the work so that each year we may turn out into the plant a few men that look upon "Safety First" as a responsibility instead of a mere slogan.

In general, in all industrial plants, the application of measures for the promotion of safety and welfare are similar, but each industry is confronted with a problem of its own which must be solved according to the conditions to be met. When we speak of "safety appliances" we immediately think of guards to machinery, and when we refer to "welfare" the human element receives the first consideration, but the details pertaining to guards and features representing the human element must be dealt with separately, according to the industry in question.

Enforcing Rules

There are places around some machinery which cannot be adequately protected by a guard, and when such places are encountered it is necessary to instruct, caution, or discipline against any unsafe or dangerous practice on the part of employes. We have found that certain guards are cumbersome and impracticable from an operating and maintenance standpoint, and when such is the case it is necessary to adopt and rigidly enforce rules against violating such measures.

When a safety rule is violated the disciplinary measure meted out to the employe sets an example before his fellow workmen which is of greatest value. We do not always find it necessary to discharge a man, unless by repeated carelessness he places not only himself but his fellow workmen as well in constant danger. For a first offense the man is instructed by a member of the Safety and Welfare committee how to avoid a repetition of a careless act. On a second and third offense the man is disciplined by a lay-off of from three to ten days. This usually suffices, and the man tries to protect himself as well as his fellow workmen, but occasionally a case comes up where we find, for the

good of the service, it is necessary to discharge the offender.

Men who have been in the service for some time, through the routine of their duties, neglect necessary precautions and are apt to become careless around the machinery with which they have become familiar. The newer employes are not so apt to run into these heavy hazards, because they are naturally somewhat afraid of the heavy machinery in the plant, but due to their lack of knowledge of the possible hazards they do run into a lot of injuries in the handling of miscellaneous small objects, receiving minor bruises, burns and sprains. We take particular pains to instruct new men before putting them into the plant.

Picking Men for Quarry Work

Of the number of men in the quarry, at least 75 per cent are engaged in operation such as stripping, drilling, blasting, hand loading, pit work at the shovels, track work, and general labor. We pick out men with the greatest possible care for the more hazardous work of loading holes, blasting, and hammer drilling under heavy banks. We instruct these men constantly, for we realize that by carelessness, in handling dynamite or drilling a block hole in a large rock —which may not be too well anchored —and similar work, they may cause injury to a large number of men. We try to instill in our men the thought that dynamite is made to go off and it may do so with the slightest bit of careless handling.

I believe the greatest hazard in any quarry is the constant danger of an accident involving a large number of men. This may come from a premature explosion of dynamite, especially if men are allowed to work in front of a bank which is being prepared for blasting. We take particular precaution against this danger, not only by careful supervision of the work, but the enforcement of disciplinary measures upon the men who violate any of our well-established rules.

Referring again to quarry machinery: We have given particular attention to the guarding of shovels, gears especially being well guarded according to best practices. We particularly insist on steam shovel engineers making a careful inspection to see that everything is in good condition before operating and that no one is in the pit. No one is allowed to pass in front of the shovel while loading cars.

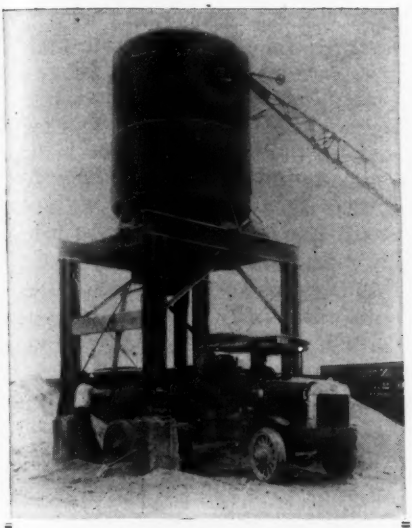
Night Operation

I am not informed as to how many quarries operate at night, but at Hannibal we follow this practice and have been successful in keeping the number of night accidents down to a minimum. Night operation in a quarry requires good illumination at the shovels. On account of the constantly changing positions of shovels, it is not always feasible to illuminate the pit with electric lights. We formerly used heavy-power lump carbide lamps, but the large-lump carbide generators are dangerous. We have been using, during the last year or so, a type of lamp which utilizes carbide in a compressed cake form. This cake is placed in a bell and by an ingenious arrangement the water is entirely withdrawn from the cake when the light is turned off and thus the gas does not continue to generate and permeate the atmosphere surrounding the tank with carbide gas which may be exploded by the lighting of a match close to the tank. Entire absence of gas around the tank at all times is a distinct safety feature in the use of this lamp.

Moving of Raw Material

In moving raw material from the quarry there are one or two precautionary measures that are necessary to follow up closely. One is to keep

employes off the tracks and the other is to make the switchmen careful in handling cars. It is rare practice now to see a switchman open a coupler with his foot, but it was not so very long ago that the switchman seemed to enjoy waiting until the cars were about five feet apart, then preparing the couplers for proper connection with one of his feet. Switchmen should particularly be cautioned against running ahead of moving cars in order to throw a switch. We try to teach them that they should at all times keep within the range of vision of the engineer—this for their own protection.



The Gravel Tank.

NOTE the sand and gravel tank. The base is constructed of reinforced concrete, a very heavy mat being placed in the ground for the pillars to rest upon. The capacity is 50 yards. It is built of heavy boiler steel and equipped with fast working gates which are so arin the yard of the Superior Sand ranged that either truck or cars can be loaded out of it. The tank pictured above is located and Gravel Company at Detroit, Mich. The present method of filling is with a locomotive crane. A truck carrying 5 yards can be loaded in less than 3 minutes, making a very fast and desirable equipment. General Superintendent C. E. McCausland states that it is a great labor-saving device. The motor truck shown in the picture is a 5-6 ton Gramm-Bernstein.

Where guards are used over gears, such guards should have sides to include the full depth of the teeth, and where spoke gears are close to platforms and passageways the sides should be protected.

Railings for rear guards or along moving machinery should be a suitable distance from such machinery or else have a screen or solid guard along the side. Railings, wherever constructed, should be 42 inches high, with at least 6-inch boards. Posts should be of sufficient strength and well secured at the base.

All overhead platforms, floor openings and runways should be provided with properly constructed railings; should be kept clear of any obstruction or loose material which may be thrown down on the floor below or into moving machinery.

All open stairways should have railings on both sides, the top rail should be 36 inches above tread. Closed stairways require only a single hand rail. Stairways over 48 inches wide should have an additional railing through the middle of such stairway. Portable ladders should be provided with a tip to eliminate danger of slipping. Ladders used to get at overhead shafting should be provided with a substantial hook to fit over the shaft. Wooden ladders should have rungs substantially housed into the side rails and protected by a strip along the face of the sides to prevent the rungs from pulling out. Vertical ladders should

have a good clearance between the center of the rungs and wall and where long ladders are used landings should be provided at proper intervals.

Chains and Belts

Wherever sprocket chains are so located that in breaking they may fall on platforms or into moving machinery, and particularly where they are above passageways, they should be guarded by a solid guard on the sides and bottom. We all know that sprocket chains are usually removed because they break. We have found on certain drives that whenever a chain breaks at certain definite intervals, say within six months, it is a good plan to replace the chain in, say, four months, as the loss due to a choke by the breaking of a chain is more expensive than getting shorter life out of the chain. Chains that are taken off can, of course, be used on less important drives and this is a good practice to follow. It is also safer to remove the chain than to allow it to break. Belts running through floors, or vertical belts, should have guards to a point about six feet above the floor. All horizontal belts should have guards to eliminate danger of men walking into such belts.

All bearings and parts of machinery requiring oiling or other attention should be provided with means of applying the oil or other material safely. This can be accomplished by piping bearings to the side or to a nearby platform.

A screw conveyor is about as dangerous a piece of machinery as we have around the plant and rules should be enforced to keep men off the conveyor tops. In repairing elevators, particularly when a link or bucket must be removed or replaced, provision should be made for keeping the chain from rolling back.

Construction of Guards

There is so much safety work to be done in any plant that we endeavor not to attack unnecessary places, but concentrate our attention on guarding of such machinery which presents a real hazard. Further, guards are very often more dangerous than the machinery itself, for often a man will neglect to remove a portable guard before attempting repairs; therefore, in installing guards, particular attention should be given to constructing them in such a way that the machinery is accessible, or, if possible, to so arrange the guard that it can be readily removed before any maintenance work is attempted.

Railings may often be used to better advantage than guards. In cases where there is a possibility of a man walking into machinery, a railing is installed to keep him away from that particular place. These railings prove to be especially valuable in preventing short cuts that men are likely to take in the performance of their duties.

It is of the greatest importance that foremen, particularly, be carefully instructed on safety work, as through the foremen we endeavor to instill among all employes the interest and importance in this great work. At the meetings of our Safety and Welfare committee we get many suggestions and ideas from employes, and we endeavor to follow up any good suggestion. We find that the man usually watches the work closely and greets with pleasure and satisfaction the final adoption of a measure which has been the growth of his own idea.

Use of Electricity

The replacing of steam with electric power gives rise to conditions which previously did not exist. Formerly it was only necessary to guard against electrical hazards at low voltage. Power is now received at our plant at 33,000 volts, and a large part of it

is distributed at 2,200 volts. The distribution is accomplished by remote control from a single switch gallery under the supervision of a chief operator, through whom all switching operators are forwarded.

The switchboard operates at 110 volts, the 2,200-volt oil switches being in a bus room below the gallery. Each oil switch is isolated by asbestos barriers and red and green lights are used to indicate whether the line is in or out of service. Carefully drafted rules have been instituted regarding safe and efficient operation. Each operator is supplied with explicit instructions and a code must be used in transmitting switching orders, all of which are repeated back in order to avoid the possibility of a mistake and consequent danger to life and property.

We follow the general practice of marking switches to indicate that the machinery is out of service. We record on the tags the time, date, reason, and name of person who ordered the line to be held. Very often more than one motor is used in a certain operation, and in such case the sequence and order of starting and stopping such motor is posted and the switches likewise numbered. All electrical machinery is carefully and adequately supplied with emergency trip-out and time-limit relays.

In working around electric equipment men are instructed to treat all circuits as live, as the insulation may

Speaking of Service

SPEAKING of "service," how does this listen? The Pioneer Bridge Co., Mitchell, S. D., purchased a 2-ton Republic truck and hauled crushed rock from that city to its work three miles out, placing 32 tons of material on the work in nine hours, and traveling a total distance of 72 miles daily. In measuring up the dump body the company was amazed to find that it contains 60 cubic feet and that it had been hauling this body level full of sand and gravel the entire season, a load which would weigh not less than 6,000 pounds, and no doubt at times as high as 7,000 pounds. It was not the concern's intention to overload the truck in this manner, being under the impression that it was a 45 cubic foot body. The truck was put into service immediately upon its arrival and no measurements were taken to ascertain the capacity. The truck stood up wonderfully well under this overloading.

be defective, and that they should not touch motors or related apparatus when they are in operation, but should play safe at all times. Shocks even from grounds are disagreeable and flashes cause serious copper burns as well as injuries to the eyes. Circuit breakers should never be thrown when switches are closed and before closing them it should be noted that the starting box handles are all down. There is a possibility of the circuit breakers opening at any time and for this reason it is well to keep away from them to avoid flashes. In stopping motors, circuit breakers should always be tripped first. Our men always guard their eyes in tripping a circuit breaker and when starting a motor they keep away from the commutator as a flash-over may occur at any time.

While we believe we have taken every possible precaution against injury to employes from electrical equipment, yet there is the ever-present danger that cannot be entirely eliminated. All operators in the power department are thoroughly instructed in the Schaeffer, or prone-pressure, method of resuscitation. We also have, in our emergency hospital, a lung-motor which is readily available for prompt use.

Drinking Water

As I stated at the beginning, welfare work is closely bound up with safety work and I want to tell you about one of the best things we have recently installed. Formerly drinking water was supplied to employes from springs, but we found that occasionally, during periods of heavy rains, the water would not only get cloudy but would actually contain surface drainage.

The system which is now in operation utilizes Mississippi river water, which is filtered, refrigerated, sterilized, and then circulated through 12,000 feet of galvanized pipe to about forty sanitary drinking fountains conveniently located throughout the plant. This amount of pipe is broken up into loops, through which the pure refrigerated water is pumped. The longest of these loops contains about 5,000 feet of pipe. Most of the pipe is laid three or four feet under the ground and no insulation is used, but wherever the piping is above ground it is covered with cork lagging. About 1,500 gallons of water are circulated per hour, the water leaving the pump at an average temperature of 40 degrees Fahrenheit, depending upon the air temperature. A fairly uniform temperature is maintained at the fountains, varying between 40 and 50 degrees Fahrenheit, depending on the distance of the fountain from the pump.

The refrigerating plant is a regular 12-ton ice-making outfit and the filter is of a much-used type, but the sterilizing part of this installation is very unique. This apparatus is known as a R. U. V. sterilizer and utilizes the ultra-violet ray as produced by a special mercury vapor lamp, sending its rays into the water through a quartz tube. The ultra-violet ray utilized in this manner has the power to destroy all germ life in the water without affecting the quality of same or in any way changing its natural constituents.

Shower Baths

This drinking water system has not only reduced the expense and trouble of supplying the workmen with water and ice in barrels but has been a big step in the line of welfare work. The installation has been greeted with enthusiasm by all of the employes, and they are likewise greatly interested in another line of work now under way. This latter is the installation of sanitary closets and showers.

It is unnecessary to mention the advantages of the first but shower baths are almost of equal value. The first one we built contained three compartments, but we found that it was not

used to any extent—at least there was never more than one man in the shower compartment at a time. Upon questioning the foreigners we found that the showers, as constructed, did not give the necessary amount of privacy that they demanded. Accordingly we partitioned off the shower baths and now find that they are always in constant use during the half-hour or so following the end of the shifts.

There is enough safety and welfare work around any quarry and plant to keep us all busy for some time to come.

Cost Keeping for Quarries

BY D. J. HAUER, C. E.

IN TOO MANY CASES business men do not figure into their production cost all of their overhead charges, thus really making a charge of some of their overhead expenses against their figured profits, which do not show until the end of the season, when it is too late to curtail any such expenses. Overhead costs are always difficult to keep and apply, but it is possible not only to keep such costs, but to also apply them daily. However, some few items of overhead costs must be averages, based upon past work, while the rest can be actual daily costs. For these reasons there should be a special cost sheet or sheets devised for these costs. Then too as such items of expense are confidential, they should not be included on the daily operating cost sheets, otherwise they cannot be kept secret. The overhead cost sheets should never be allowed to go out of the main office and when not in use should be kept under lock and key.

SOME QUARRY MEN figure overhead costs on a percentage basis, either based upon the daily or weekly costs, or upon the bulk of business done during a week, month or season. But a little thought given to this will show that such a cost is not only not true but is the poorest kind of a guess. The bulk of business will fluctuate not only during the season, but decidedly over a year, being small during the winter months and large during the summer. On the other hand, the overhead costs may be reasonable during the busy season and very high during dull months and the winter.

Then, too, operating costs vary according to the weather and the demand for the quarry products, while the overhead expenses may vary little from day to day. The only time that a percentage is of value is in analyzing the costs for a month or season. Overhead charges figured upon a percentage basis only lead to trouble.

The various items of the overhead charges will be discussed and then the method of handling and applying them will be taken up.

Superintendence

The word superintendence can cover two different items. A superintendent or any foreman employed in a quarry can be classed under this heading, but it is obvious that if these men devote all of their time to the quarry operation, their salaries should be recorded in the daily operating costs. Certainly all foremen working in a single quarry should be charged to that unit, but if a superintendent has charge of two or more quarries it is evident that his wages and expenses must be divided between the several quarries. The proportion to go against each will be explained later.

If a superintendent is in charge of

a quarry and also looks after office details, besides selling and other work, then the salary of such a man should be charged partly to operating expense and to overhead. The same thing is applicable to a salary drawn by the owner.

Under the head of superintendence must be included all costs of general employees on the outside of the office, who are not engaged in actual production. This includes wages paid to weighers, night watchmen and time keepers.

Office Expenses

Office expenses must include the expenses of the men in the local quarry office and also in the general office, if one is maintained. It is advisable to keep these two items separate. The headings that can be used are "quarry office" and "general office." Under these will come all the salaries of bookkeepers, stenographers and clerks, the cost of telephones, telegrams, cost forms and all stationery and the many little items of expenses that are not included in the other headings discussed in this article.

Some few quarrymen — and the number is rapidly increasing—are employing civil engineers and efficiency experts to cheapen their work and increase production. It is the practice to include such costs in office expenses, but the better heading is under superintendence. A more logical practice would be to include such costs under a separate heading as "engineering." In this way it is readily ascertained if the decreased cost or increased production justifies the expense incurred.

Owner's Expenses

Some quarrymen also include their own expenses under the heading of office expenses, but this, too, only leads to confusion. If an incorporated company is operating a quarry then the officers' salaries should be properly distributed between the headings of office expense and superintendence. If a company is incorporated, an officer or director should never be allowed a drawing account, but each should be paid a salary, passed upon by the board of directors. Thus if financial trouble occurs, creditors cannot recover from officers and directors sums of money paid out by them without legal warrant, as is possible if drawing accounts are allowed. The law does not look with favor upon drawing accounts.

There is nothing illegal about members of a co-partnership or an individual owner drawing money on account, but it is a wise policy to also use salaries under such conditions, as then each man has his own money to cover living expenses and there is not the chance of a dispute as to one man drawing more than another.

Again, in case of individual ownership, a salary for such work as the owner is called upon to do should be charged so that this expense be included in the cost of production, just as is done with the salary of the president of an incorporated company. The owner is likewise entitled to his living expenses even if profits are not being earned, for he must live just as well as the grocer, whose business may not be solvent. If profits are carried they can be put back into the business to further increase it or reduce the cost of production, or such profits can be drawn out of the business and invested in other lines.

With the owner there are also extraordinary expenses that he may be called upon to make, such as entertaining, charity and similar items. These need not be charged to his personal account, nor need they come out of his salary, but they should be recorded separately from the other ex-

penses and so set down in the cost-keeping system.

Insurance and Compensation

Insurance and compensation is a steadily growing item of expense today, but a very necessary one, for it is much cheaper to pay premiums on policies than to stand the expense of one bad accident. No business man can afford to be without insurance and any man limits his commercial credit by not carrying insurance.

Fire insurance is necessary for most quarrymen. It is quite surprising in visiting quarries throughout the country to see the large number of plants that have been destroyed by fire during the past decade. Many old plants, and even some new ones, are built of timber and few quarries are equipped with such pumps and apparatus as would be necessary to save them in case of a conflagration.

Quarrymen furnishing material for fire prevention should themselves build or gradually rebuild their plants so as to make them fireproof. Bins and the low walls can be made of concrete, as can the platforms, shops, storehouses or offices. If concrete is not used, then stone masonry can be employed.

In some cases the roofs can likewise be of concrete, but where this is not possible metal or other fireproof roofs can be used. The cheapest and best insurance against fire is in the construction of the plant. Lacking this, insurance policies should be purchased.

In the quarry business life insurance and also partnership policies are essentials. A man should always protect his family against financial loss through his death. A business may be a good paying one, but let the owner die and his family may realize little of it, in selling or otherwise settling up, so the safe way is to have one or more good insurance policies.

It is the same as to partnerships. The death of one partner may effect the others adversely as to finances. There is only one way to guard against such loss and that is by modern partnership insurance. The firm pays the premiums and the policies are made out in favor of the partners.

Automobiles and trucks should also be insured against both fire and theft. This is only a modern business necessity. Some owners of teams insure their horses against theft.

The laws of most states now com-

He Knew the Quarry.

HAD HE BEEN an executive, his methods would have been called "personal efficiency;" a department manager of a clerk would have been labeled "on the job" or "up on his toes."

But he was only an old blacksmith. For years he had been doing about as much as two average men and saving the company a substantial sum every year on his work.

Here is how he did it: He tacked a 10-foot strip of wrapping paper upon the wall and made a fairly accurate sketch of the quarry thereon. The quarry was being worked in various places by gangs of men, each of whom bore a number. No man could get his "steel" sharpened without telling his number to the old blacksmith, which was carefully recorded on the sketch at the point where the man worked.

In this way and after due time the old blacksmith obtained a reliable knowledge of the hardness of the stone in all parts of the quarry and sharpened the "steel" accordingly.

pel employers to compensate their employees against personal accident and death. This can be done through a casualty company which has conformed to the state laws. This is an expense that varies with the pay roll. The rates paid upon the policies depend upon the amount of the pay-roll and also upon the safety precautions taken at the plant. This is an important matter, the safety-first idea, but it must be discussed in another article.

The expenses incurred under this heading can be listed by the month or week so they can be entered and considered with the other overhead charges.

Selling Expenses

The cost of selling can come under two items, that of actual selling and the salary and expenses of salesmen or commissions paid them, and the cost of collecting money for sales, including bad debts.

There are times when the costs of these may be little, when the demand for stone is large and sales come direct to the office, instead of having to send salesmen out to make sales. Then, too, some quarries have exclusive fields, so that all sales come to them; but this is seldom the case, for quarries frequently have to compete with gravel producers.

As a rule, if large sales are to be secured, men must be sent out to make sales in competition with other quarries. At times this cost, due to extraordinary expenses, may be heavy. It is the same with bad debts. With good salesmen and collectors the amount of bills remaining uncollected may be small, yet if great care is not exercised this item may be large. Whatever it is, it should be recorded and used in the cost keeping.

When stone is delivered, especially in trucks and teams, this cost should be kept and included in the cost-keeping system, for money can readily be lost on deliveries and the loss not discovered for some time.

Taxes

Taxes was a subject that hardly deserved notice at one time, but today it has become an important matter. A quarryman now has many kinds of taxes to pay and record. He has the taxes on real estate and personal property, and if he conducts his business as a corporation, he will have to pay taxes to the state for the corporation. Besides these will come the Federal corporation tax, the income tax and possibly the sur-tax and the excess profit tax. Some of these tax items are chargeable to the cost of operating, but those pertaining to income, sur-tax and excess profit tax cannot be charged against the operation, for they are meant to be a direct tax upon the next income. Today it is advisable to keep a ledger account for taxes.

Land Values

A quarryman must include in his cost the interest on his land values. If the money was invested in other real estate this would be done, so there is no reason why the same principle should not apply to quarries. The reasonable method is to charge six per cent on a fair valuation.

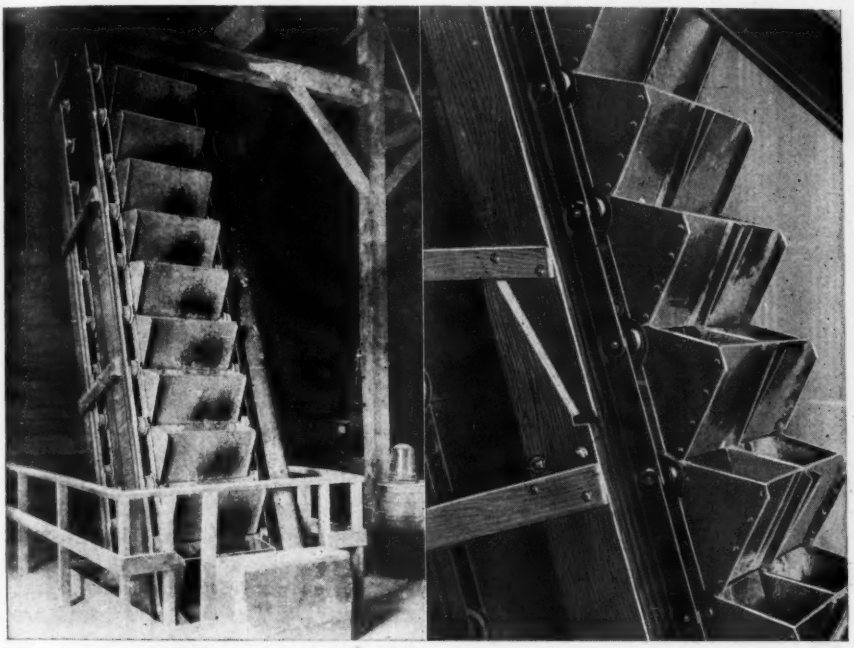
If a quarry is located near a city the land is likely to so increase in value as to more than pay for any interest not charged against the operation. Sometimes quarrymen treat the interest on land values as though it was royalty.

Royalty

This is always done if the land is rented or leased and a royalty paid upon a ton or yard basis. This makes an easy record for cost keeping and answers the purpose either when the

land is leased or owned, but for the last-named case the royalty charge should be less than for the former.

To figure and apply overhead it must be done upon a percentage basis; that is, figure up the total overhead for a given period of time, then figure out a percentage to be charged for each day. This daily amount then can be pro-rated by the number of tons produced, giving a unit charge to be used in the cost records.



Left—Bucket elevator mounted on double strands of chains. Right—Double compartment adaption, one of which handles sand and gravel and the other crushed stone.

Features of Elevator Construction

BY MINER RAYMOND

A CERTAIN ELEVATOR was built not so very long ago for a company owning and operating several plants. The elevator was equipped with a double strand of chain and in a season's service the take-ups were turned down less than 1 per cent of the chain's length, with just a very few pins and bushings in need of replacement. One reason for using a double strand of chain of this kind in big, slow elevators lies in the fact that the chain rollers travel on continuous rigid guides of bar-iron or angles. The chain guides provide a straight travel on both up and down runs, which results in a steady operation and a saving of space. Furthermore, the points of greatest pressure in the succession of loaded buckets are continuously supported on the chain track.

These are, of course, points which relate more especially to design than to service, but for handling abrasives such as stone and sand the elevator should be built to stand the racket and should be as nearly fool-proof as possible, whether belt or chain is used. One can never tell just how much an elevator will do till it is tried.

EDITORIAL

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Making Americans

A FEW DAYS AGO Robert H. Pausch, of the Marble Cliff Quarries Co., Columbus, O., and D. C. Souders, of the France Stone Co., Toledo, Ohio, were discussing welfare work for employes of stone quarries. Both greatly favored the idea. They were joined by W. J. Keevers, in charge of the crushed stone department of the Marble Cliff company. "We employ 500 men," said Mr. Keever. "Many of them are foreigners, and I believe it would be a good plan to build for them a combination church and school house at our own expense, and also erect homesteads on such easy terms that they could pay for the houses without any hardship. We would not only benefit the men, but it would help us by stabilizing labor conditions. It would tend to create a regard for their homes among the men. The church and school house would have to be built at the company's expense. Priests have visited our men often, but in the old country these institutions were furnished by the state and the laborers want them free here, too."

The recent remarks of Secretary of the Interior Franklin K. Lane are particularly significant in this respect. "Our man power is deficient," said Secretary Lane, "because our education is deficient. 'The danger is within —the aliens are not Americanized. Ignorance of our language bars them from becoming loyal Americans, and the foreign language press only too often distorts the truth in the interest of some propaganda hostile to America and its institutions. It is a menace that our industries are largely carried on by foreign laborers who care nothing for our success and are not, therefore, putting their best efforts into the daily work. Decreased production; labor troubles such as strikes, or sabotage, and accidents in industries due to ignorance, all constitute a menace. Fortunately, the remedy is in the hands of the patriotic leaders of industry. It is up to them to develop a spirit of loyalty to America among the foreign-born employes, and the employers can do it very successfully."

WE HAVE long felt that the sand and gravel industry warranted a trade publication devoted to its interests, rather than just a page or two in general trade journals. PIT AND QUARRY deals with subjects that we are all thinking about in our every-day business.—Indiana Gravel Co., Indianapolis, Ind.

Bookkeeping.

(Continued from page 224)

cost to produce it will be the profit, or a loss.

The Necessary Books

The three essential books are: Day Book or Journal, Cash Book and Ledger. While some others are necessary, such as Order Book, Time Book for the help, the first three are the principal ones and show the transactions and results. The others are helps and not essentials. While the size of the business must determine the number of books, these will be all that are necessary for the ordinary business.

Day Book

This shows the daily transactions, hence the name. The transactions should be entered the day they occur. They are of prime importance from a legal standpoint. As it is the first record of the transaction it is termed the original or historical entry. It alone can generally be put in evidence if the account is disputed.

Entering the transactions is important. A uniform style in describing, or making entries of the same kind of transactions, should be used. The description should be brief, but plain enough to be intelligent. The quantity and price of each item should be given.

The following transaction will illustrate the entries in the ordinary course of business.

George Hemler is a dealer in building supplies and makes a sale on September 15 to Wm. Andrews, as follows:

30 tons of sand, @ $1.50. 16 tons of gravel, @ $1.55. 60 bushels of lime, @ 40c. 50 tons of broken stone, @ $1.85. 25 barrels Portland Cement, @ $2.50.

The Day Book entry would be as in Fig. 1.

A month later Mr. Andrews pays the bill and the entry is made as in Fig. 2.

It may well be assumed that many other sales and entries in the Day Book were made between these two dates. It would be possible for Mr. Hemler to keep only the Day Book, but it would be decidedly inconvenient. To determine the state of any particular account he would have to go over numerous entries. To avoid this a summary of the account (debits and credits) is sought by the use of the Ledger.

Ledger

The Day Book, itemized record of Mr. Andrews is entered in the Ledger in one sum, as in Fig. 3.

The numbers in the column next to the amount column refer to the pages in the original book of entry (Day Book, Journal or Cash Book) from which the entry is posted.

Cash Book

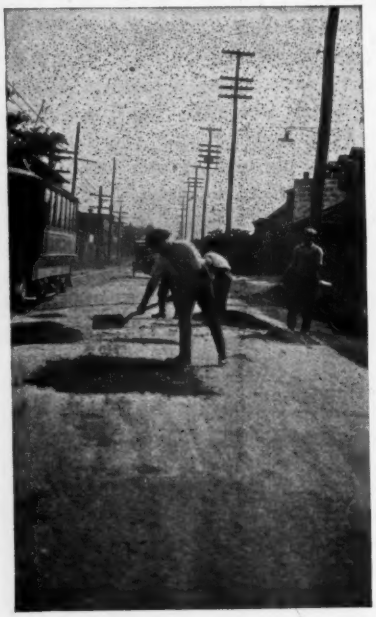
As the owner of the business wishes to keep an accurate record of all the cash received and disbursed, a Cash Book is necessary. When the payment was received from Mr. Andrews this entry would be made in the Cash Book, as in Fig. 4.

It is not necessary to make the cash receipt entry in the Day Book. The Cash Book entry is sufficient and can be posted to the Ledger, which makes the Cash Book an original book of entry.

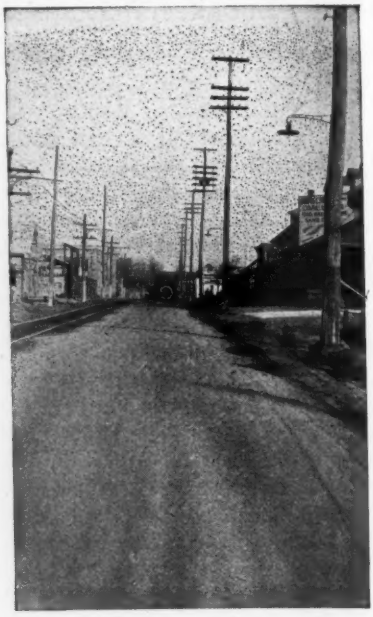
The above order is small and its record on the books of Mr. Hemler quite simple, yet in it are involved practically all the important transactions of the whole business for the year. In the course of a year he may have a thousand orders aggregating $75,000, but these do not change, add to or take from the various transactions or results involved in filling the order of Mr. Andrews.

An analysis of this order will show the three elements of a price—Mate-

(Continued on page 243)



Repairing Bituminous Concrete on Baltimore Pike, near Phila., Pa. (8-30-1916).



Same, two months later, showing repairs after being consolidated by traffic.

Increasing Interest in Cold Mix

Its Adaptability to Quick, Economical and Satisfactory Repairing Is Shown by the Experience of Noted Roadbuilders.

ROAD BUILDING and road material men are manifesting considerable interest in the "cold mix" method of making repairs on or resurfacing roads. The experience of the highway department of the state of New York with emulsified asphalt for use as a binder for paving and repair work is interesting. The state has more than 6,000 miles under maintenance, repairing worn surfaces, pot holes, breaks, cracks and roads with asphaltic emulsion mixed with stone without heating. The emulsified asphalt is shipped in barrels and is always ready for use. It is not necessary to stop traffic while making repairs. About 1 part sand and 3 parts stone is commonly used for aggregate.

Fred W. Sarr, second deputy commissioner of the State of New York Commission of Highways, tells of his experience with the cold mixed binder, as follows:

"The advantages of the material are that no heating is required either of the mineral aggregate or the bituminous material, and the mineral aggregate, nor the surface upon which it is laid may not be dry; in fact, we often used wet stone from the maintenance piles and fill in depressions and holes in the pavement immediately after a rain, simply brushing out the surplus water.

Another advantage is that the ma-

terial can be used by an individual patrolman, while with heavier binder it is necessary to install a gang of at least four men to use the heavy materials that require heating before using.

"A still greater advantage is the fact that a proper quantity of asphalt as compared with the mineral aggregate may be accurately determined and used as the material is mixed, either by hand or with small concrete mixers, while with the heavy binders, which require heating and are not mixed directly with the mineral aggregate, it is necessary to depend on the judgment of the labor making the application to the surface of the old pavement or over the new stone as laid, with the result that almost invariably several times the necessary quantity of binder is used, which is not only wasteful but the results are not as satisfactory.

"While the material is in an emulsified state the same may be diluted by addition of water. The best results are obtained with the so-called open mix, which allows the water to separate by evaporation within a short time, and for this same reason, the best results are obtained in applying the mixture with the mineral aggregate in thin layers from one-half to one and one-half inches, although good results have been obtained with a course two inches in depth; but for this depth, a two-layer method is recommended, using finer mineral aggregate in the top layer."

The Emulsified Asphalt Co. is located in the Hume-Mansur building, Indianapolis, Ind.

New Cement Gypsum and Lime Directory.

The 1918 Directory of Cement, Gypsum and Lime Manufacturers is now ready for distribution. The directory is the twelfth edition and is corrected to January 1, 1918. It contains a list of cement companies; list and location of mills with map; alpbabetical list of officers, superintendents and chemists of cement companies; list of brands of cement companies; list of gypsum companies; list of lime companies; buyers' guide; advertisements of machinery and supplies manufacturers; names of officers of the Portland Cement Association and the National Lime Manufacturers' Association and statistics on the output of Portland cement, gypsum and lime.

As usual, the directory is pocket size. It contains 264 pages of condensed and conveniently arranged information useful to the proper conduct of business relating to the industries included. The price is $2 and the directory can be secured by applying to this office, Pit and Quarry, Rand-McNally Building, Chicago, Ill.

Bookkeeping.

(Continued from page 241)

rial, Expense, Profit. The material cost something, labor (expense) was required to handle it, the salary of Mr. Hemler, rent, bookkeeping, telephone, etc., and profit are all in that charge of $248.80. But how much were these different items, how much was the profit? There is nothing in any entry that Mr. Hemler has made so far that shows this. Suppose he has a thousand orders during the year, charging his customers for the material furnished, and crediting them with the payments, will his bookkeeping show the results of these transactions?

The July issue of Pit and Quarry will deal with this phase of bookkeeping.

APPROXIMATELY 100 miles of permanent surfaced Lincoln Highway will be constructed in Illinois soon and bids will be advertised. The major part of the work will be of concrete, built to standard Lincoln Highway specifications with a 7-foot shoulder of dirt or gravel on either side of the road.

PIT AND QUARRY fills a place that no other magazine does, as it is devoted exclusively to the sand, gravel and stone business, and not to a dozen different interests. We shall not miss reading them. —W. F. Saunders & Sons, Syracuse, N. Y.

ASSOCIATION ACTIVITIES

Discuss Expansion Plans

Agricultural Material Association Members Meet—Committee Will Present Definite Suggestions.

ABOUT TWENTY MEMBERS of the Agricultural Lime and Limestone Association met in Columbus, Ohio, May 1, to discuss plans for increasing the demand for their material. As a result of the suggestions and opinions brought out a committee of five will meet in Cleveland, Ohio, in the near future and select a definite code of procedure. The good work which the association has done under the guidance of Manager G. J. Wilder is evident to all and it was determined that the organization would be maintained and enlarged.

When it comes to the question of how fine the material should be ground there is always difference in opinion. Sometimes the soil experts in the various state universities do not agree. Such an important matter is bound to come up at any agricultural limestone meeting, and so it did upon this occasion. J. C. King, of the Carbon Limestone Co., Youngstown, Ohio, had found after investigating sales in Pennsylvania that the farmers prefer a material passing through a 100-mesh screen and gave it as his opinion that the fine-ground product could be marketed and promoted easier.

While this opinion seems to prevail throughout the Eastern states, including the eastern part of Ohio, it is not shared in the Central West, particularly in Illinois. Many stone men of long experience favor the 10-mesh product, or from one-quarter inch long run and that the lower prices make for more extensive use. They downward to dust, claiming that it performs just as good service in the

G. J. WILDER,
Manager, Agricultural Lime and Limestone Association, Columbus, Ohio.

admit that the pulverized product gives quicker results, but assert that it leaches out and is scarcely effective the second year, whereas the coarser material remains in the ground and continues to throw out its acid-correcting power.

This is a problem that admits of much experimentation, and in the

meantime all interests should be drawn together in a great educational effort and give unlimited cooperation to Mr. Wilder.

Prof. F. E. Bear, of the Ohio State University, spoke of ways and means of increasing the demand from farmers. He believed that literature sent to the farmers should deal more with the crops, with limestone mentioned only in an incidental way. A booklet entitled "Clover Crops," for instance, would command more attention than one discussing "Liming Soils for Clover." Incidentally, he thought the coarser material obtains as good results as the finely ground stone, and that the extra expense of making the latter is not justified.

Advice as to the proposed advertising campaign was given by H. S. Butler, an advertising expert of Mumm-Romer Co., Columbus, Ohio.

Perry Fay, of the White Motor Truck Co., Cleveland, spoke of the increasing use of motor trucks for delivering agricultural limestone a distance up to ten miles.

The committee which will meet later consists of F. R. Kanengeiser, chairman; Henry Angel, Wm. H. Hoagland, J. C. King and H. E. Bair.

ATTENDANCE

Henry Angel, Kelley Island Lime and Transport Co., Cleveland, Ohio.
H. E. Bair, general manager, France Stone Co., Toledo, Ohio.
H. V. Briggle, O. C. Barber Allied Industries Co., Canton, Ohio.
Prof. Firman E. Bear, Ohio State University, Columbus, Ohio.
Clyde Calvin, Bessemer Limestone Co., Youngstown, Ohio.
F. J. Colgan, Marble Cliff Quarries Co., Columbus, Ohio.
R. J. Fuller, Columbia Products Co., Cleveland, Ohio.
Morton R. Grinnell, Yellow Springs, Ohio.
A. Acton Hall, Ohio Marble Co., Piqua, Ohio.
Wm. H. Hoagland, Marble Cliff Quarries Co., Columbus, Ohio.
F. R. Kanengeiser, Bessemer Limestone Co., Youngstown, Ohio.
J. C. King, Carbon Limestone Co., Youngstown, Ohio.
R. F. Lynn, France Stone Co., Toledo, Ohio.
Wm. Margraff, Marble Cliff Quarries Co., Columbus, Ohio.
Miss M. B. Miller, Ohio Marble Co., Piqua, Ohio.
Charles C. Ward, Michigan Limestone & Chemical Co., Buffalo, N. Y.
O. L. Smith, Cedarville Lime Co., Cedarville, Ohio.
G. J. Wilder, manager, Agricultural Lime & Limestone Association, Columbus, Ohio.
J. W. Wirth, Agricultural & Commercial Lime Co., Canton, Ohio.
Fred Witmer, Ohio Hydrate & Supply Co., Woodville, Ohio.

Promoting Maintenance.

THE INDIANA Crushed Stone Association is centering its efforts in the promotion of road maintenance. Throughout the state, as elsewhere,

Application for Membership in
THE AGRICULTURAL LIME AND LIMESTONE ASSOCIATION
406 Hartman Building, Columbus, Ohio.

....., 1918

Dear Sir:

We—I—herewith make application for membership in THE AGRICULTURAL LIME AND LIMESTONE ASSOCIATION and hereby bind ourselves—myself—and firm, or corporation, which we—I—represent, to obey the Constitution and By-Laws and all proper rules in conformity with the same.

Find enclosed Five ($5.00) Dollars for membership fee.

Signed.....

Address.....

Firm Name.....

Firm Address.....

many of the macadam roads have suffered the usual treatment of neglect, on the popular supposition that any hard road, once laid, will last forever. The association, through its energetic secretary, F. W. Connell, has in the past two years made its slogan "Macadam and Maintenance" appreciated throughout the state, so that the happy day is near at hand when taxpayers have begun to realize that maintenance means money saved.

May Form National Road Committee.

AT A CONFERENCE with Hon. Logan Walter Page, director of the U. S. Office of Public Roads in Washington, D. C., last week, A. P. Sandles, secretary of the National Crushed Stone Association, was given assurance of the specific method which the director believes will be successful in making plans for road building. Mr. Page is anxious to go on with the road program and a road committee may be agreed upon consisting of a representative of the War, Treasury and Agricultural departments, War Industries Board and the Fuel Administrator to serve as a committee to settle upon a road policy for the coming season. The questions of finance, fuel, transportation, military and food necessity will be taken care of for road building and road repair throughout the nation.

"It is little use for Mr. Page to try to carry out any program," said Mr. Sandles, "unless all the above departments are in accord, as any one of them could block the game. If this plan is carried out by Mr. Page, it is possible that some projects heretofore rejected may be approved and also include forward movement on state, city, and county improvements, as well as those to receive Federal Aid. Road builders and road users are under obligations to Mr. Page for his persistent efforts to work out the above commonsense plan which, if adopted, will insure a 75 to 90 per cent program for 1918."

Ohio S. & G. Bulletin.

THE OHIO Sand and Gravel Producers' Association has issued a four-page Bulletin with Guy C. Baker, the executive secretary, as editor. In the first number President F. D. Coppock makes an announcement of the causes which impelled the producers in Ohio to form an association. The Bulletin throughout breathes optimism and encouragement.

Increase in Production of Potash.

THE OUTPUT of all potash materials produced and marketed in the United States in 1917, as reported by the manufacturers to the United States Geological Survey, Department of the Interior, was 126,577 short tons, which contained 32,366 short tons, or an average of 26.4 per cent, of pure potash (K_2O). This is more than three times the quantity produced in 1916.

The approximate average selling price of these potash materials at the points of shipment was $4.26 a unit—that is, $4.26 a ton for every 1 per cent of pure potash (K_2O) in the material marketed. This price corresponds to $426 a ton of pure potash. The total value of the potash produced in the United States in 1917 was $13,791,922.

Potash was produced in 1917 by 82 firms, including 36 wood-ash leachers, most of them operating small works. The total production is about 13 per cent of the normal consumption of potash in the country during the years immediately preceding the war. There is now no crisis as regards the potash supply of the country, though the prices paid for what is obtained are about ten times the normal prices before the war.

MEN AND MACHINERY

Westinghouse Electric & Mfg. Company's New Plant at South Philadelphia, Pa.

New South Philadelphia Works.

SPURRED ON by the urgent need of the Government for ships, the Westinghouse Electric and Manufacturing Company has made a record in the erection and operation of its South Philadelphia Works, now devoted entirely to the production of ship propulsion machinery for the navy and the merchant fleet. A little over a year ago, the present site was plowed field; now it contains seven large buildings which give employment to 2,500 people. These buildings, comprising a floor space of over 600,000 square feet, include a pattern storage shop, foundry, forge shop, power house, erecting shop, and two machine shops.

It is expected that eventually this plant will be of a size comparable with the East Pittsburgh Works, which now employs in the neighborhood of 25,000 people, and covers a floor space of over 100 acres. A portion of the land will be devoted to a town site capable of accommodating about 5,000 people.

The plant was erected by Westinghouse, Church, Kerr & Company, with which firm Calvert Townley, assistant to the president, handled all business relations.

The Lakewood Engineering Company has been authorized to increase its capital stock from $300,000 to $1,100,000. Officers of the company said the increased capital would be used to finance purchase of several additional plants. Among these are: Outright purchase of the Dynamic Motor Truck Company, Galion, and a foundry at Elyria, in addition to a large interest in the Milwaukee Concrete Mixer Company.

Knows Powder.

MEET Mr. M. S. Kincaid, who has SOME knowledge of powder making and its use, among which is the fact that the boxes upon which he is leaning are empty—hence the lighted cigar. Mr. Kincaid began in the Pittsburgh office of the Burton Powder Co. back in '98, traveling through Pennsylvania and Ohio territory. He has been in Chicago for ten years as the representative of the Grasselli Powder Co., and has the middle west as his field of operations. He is a specialist in firing big shots

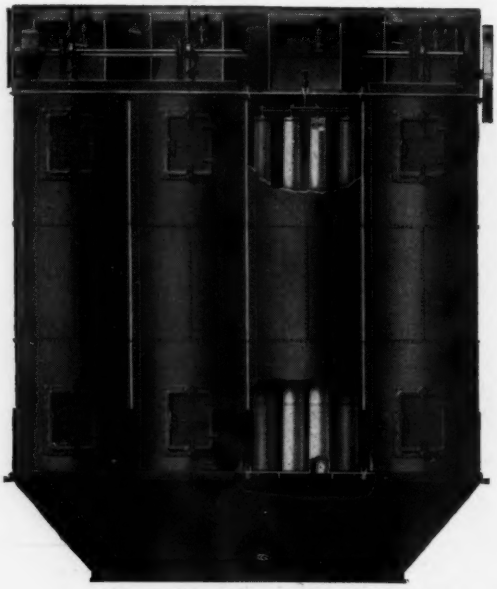
and can almost tell at a glance just what the requirements in powder should be for obtaining certain desired results. He is often consulted by quarrymen desiring to open new quarry faces or ledges and frequently gives timely advice that results in the saving of money in the operating end of the quarry. His never failing good nature upon such occasions takes the edge off of the pre-firing anxiety.

Dust Collector.

THE PROBLEM of overcoming the dust nuisance confronts many cement, lime, silica sand, gypsum and agricultural limestone plants. Besides the heavy wear on machinery, it has been found that men cannot give the highest efficiency when working in dust laden atmosphere. The collecting of dust is a source of revenue and the Allis Chalmers Mfg. Co., Milwaukee, Wis., has developed and is now offering a bag filter type dust collector, pictured here, which can be put into successful operation at moderate expense.

The collecting of dust is accomplished by filtering the air or fumes through cloth bags of special weave which are automatically cleaned at definite intervals, discharging the residue into a hopper at the bottom of the machinery. The A-C dust collector consists of a number of annular compartments, each containing twelve bags for the collection of the dust. The number of compartments required to meet a given condition will depend upon the amount of ments required to meet a given condition will depend upon the amount of air to be purified and will also be influenced to a certain extent by the amount and character of dust in the air.

The dust laden air enters near the bottom of the machine and is compelled to make a turn in entering the open lower ends of the bags. This has a tendency to drop the heavier particles of dust into the hopper at the bottom of the machine. These bags consist of a special porous cloth suitable for retaining the dust inside the bags and allowing the purified air to pass through into the compartments surrounding them. While the dust is being collected, the bags, which are close at the top, are slack and the air entering the lower end of the bags passes through the cloth and out to the fans. During the process of cleansing, a counter current of air passes through from the outside to the inside of the bags and thence into the adjoining compartments. At the same time the pags are also given several violent shakes. This shaking consists of suddenly tightening the bags and then allowing them to slacken. This cleansing process takes place in each compartment successively at intervals of approximately five minutes.



Bag Filter Type Dust Collector.

Use of Heavy-Duty Motor Trucks Increasing.

STERLING HEAVY-DUTY motor trucks are finding an ever-increasing use in handling pit and quarry products and in highway building. The dump body type is generally used, although machines are built in 2½, 3½, 5-ton worm-drive, and 7-ton chain-

ELEVATOR BUCKETS

For Handling Coarse or Fine Materials in

Sand, Stone and Gravel Plants

Continuous elevator buckets, made of heavy steel for hard service, furnished in all sizes, riveted or welded.

Malleable Buckets of Standard Manufacturers design and sizes carried in stock.

Seamless steel buckets carried in stock.

Salem Buckets of all sizes and gauges.

Elevator Casings. We are prepared to furnish complete steel elevator casings, with buckets, chain, belt, and necessary driving machinery.

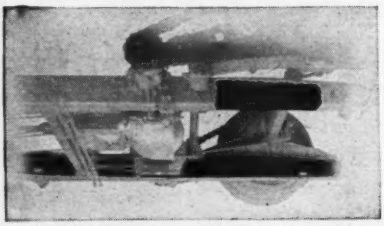
We make a complete line of ELEVATING, CONVEYING and POWER TRANSMITTING MACHINERY shown in our catalog No. 38.

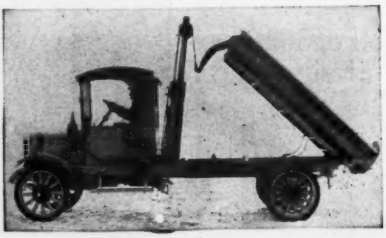
Have You A Copy?

H. W. Caldwell & Son Company

Western Ave. 17th & 18th Sts. **Chicago**

drive, with bodies for any requirements. Present railroad conditions have centered attention upon big-capacity motor trucks, and this has been





furthered by the recent government action in approving great road enterprises and its intention to rebed a vast rail milage.

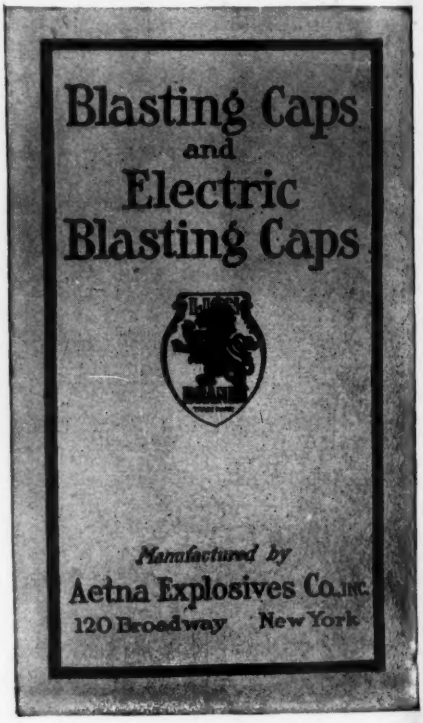
The smaller Sterling units are finding increased usage in the repairing of roads and other work. Iowa, for instance, uses motor trucks in its patrol system, carrying materials for immediate repairs and, in some cases, small concrete mixers.

Features of the Sterling truck are the small number of its parts and the wood-inlaid frame. Its makers consider the latter important consideration for the prospective purchaser of any heavy duty truck and point to the wood-inlaid frame as an efficient absorber of shocks and jars, and the means of prolonging the life of the motor and power plant, as well as reducing the hours or days laid up for repairs.

The pictures show (1) the wood-inlaid frame; (2) the heavy-duty body built for all requirements, and (3) a 7-ton chain drive heavy haul dump truck.

Booklet on Blasting Caps.

THE AETNA Explosive Company, Inc., New York City, has gotten up a little booklet entitled "Blasting Caps and Electric Blasting Caps," which is probably the most complete work ever issued on the subject. It contains 14 pages and is amply illustrated, discusses composition and

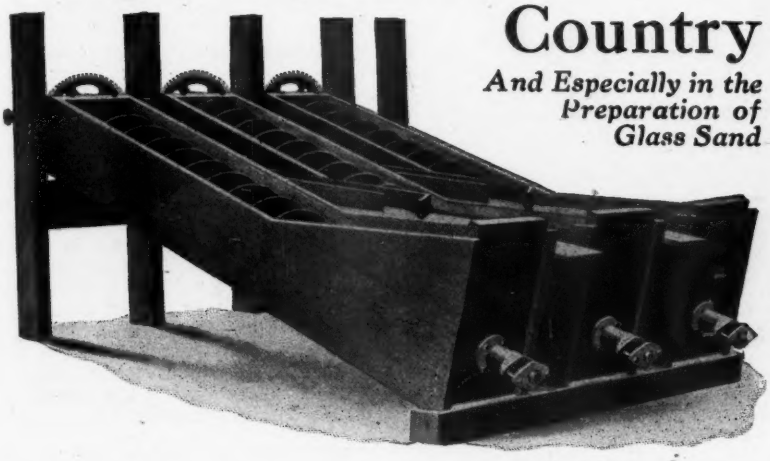


strengths, advantages of strong detonators, dependable charges, wires, handling, etc.

FIND PIT AND QUARRY a very helpful little magazine.—The Kelly Island Lime and Transport Co., Kelleys Island, O.

Used in Some of the Largest Quarries in the Country

And Especially in the Preparation of Glass Sand



LEWISTOWN
Sand Washers

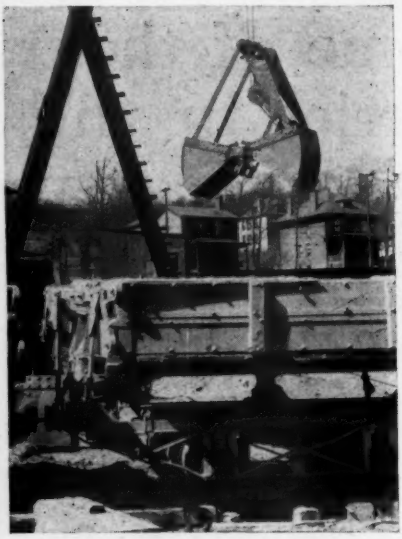
These are reasonably priced, well built, compact outfits, which can be easily and quickly installed. They are simple in construction and efficient in operation. Extensively used in the manufacture of glass sand which is so much needed today in the making of optical lenses for field glasses, telescopes, etc., required by the Government.

If you are not acquainted with Lewistown equipment and service, it will pay you to look into it.

We are in position to assist you solve your problem of whatever nature, if it pertains to crushing, grinding, screening, washing, drying and conveying, as we manufacture a full line of this machinery and equipment. Drop us a line stating what you desire information on.

Lewistown Fdy. & Machine Co.

LEWISTOWN, PENN.



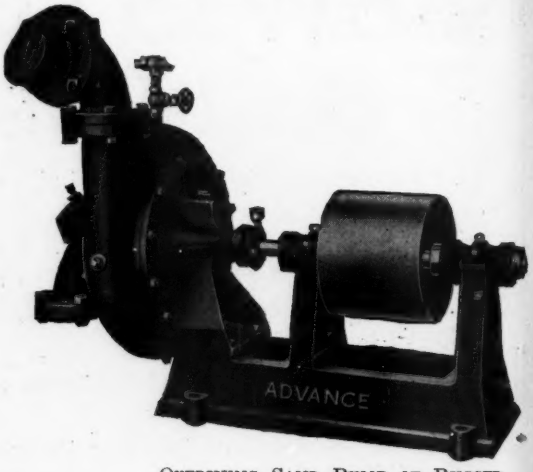
Special Sand Pump.

THE INCREASING DEMAND for high-grade and dependable sand and gravel centrifugal pumps has prompted the Advance Pump and Compressor Company, Battle Creek, Mich., to produce a line of pumping machinery for this class of work, meeting the needs where a rugged pump is required to get long service. The pump is of the overhung type, so that a new casing can be easily and cheaply installed when worn out. The casings are thick and heavy at the wearing surfaces and bear up admirably well in severe use. All clearances are properly proportioned to give high efficiency. The impellers, which are of cast steel of the enclosed type, are carefully turned and balanced, and are of suitable thickness to insure a long wearing life. It is claimed for the pump that it requires few repairs, handles material without clogging and is of medium cost. It is furnished for either belt or direct drive.

Single Line Bucket.

THE BLAW-KNOX CO., Pittsburgh, has issued the "Blaw" Single Line Clam Shell Buckets Booklet, which has just come from the printers. The bucket described is unique and very serviceable, and is particularly notable in that it is a "one-man" bucket, can be dumped by the rig operator by means of a tripping lever or by simply lowering the closed bucket until it touches the ground, when it trips automatically. When operated from overhead cranes it is only necessary to hook the bucket on the crane block and to unhook it when the work is done. Its use eliminates the expense of loading skips by hand in the case of stiff leg or traveling derricks, or it can be used on cableways designed for handling tubs or skips without any change in engines or lines. It may also be attached to portable cranes, steam shovels, and other single drum rigs without necessitating the use of additional hoisting drums.

WE LIKE PIT AND QUARRY because it keeps us posted in modern equipments, and also if we need any machinery in our business we can find just what we need best in the ads.—James H. Randles Sand & Gravel Works, Poplar Bluff, Mo.



OVERHUNG SAND PUMP OF RUGGED CONSTRUCTION.

PIT AND QUARRY is the first publication of its kind which has come to my notice where the sand and gravel industry has been given anything like a fair show.—Lake View Sand & Gravel Co., Lake View, Iowa.